DEAR CUSTOMER:

RE: KEYBOARD AND ENCODER KIT

If there are any problems with assembly of the Keyboard Encoder Kit, or any technical advice is needed, please contact our engineer

Gene Marino
Michaels Road
Gloucester, Massachusetts 01930
Telephone 617-283-0278

He will be able to assist you. Please send us a copy of your correspondence.

If you find our unit cannot serve your needs, you may return the unit within 30 days for refund.

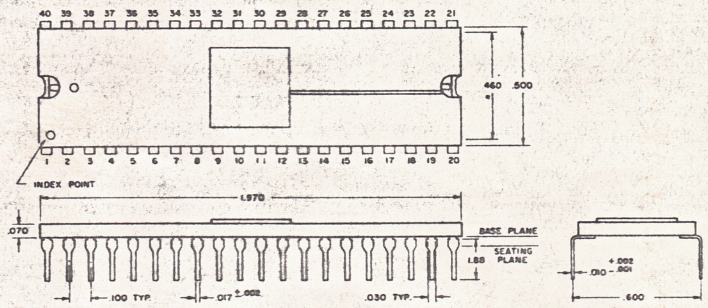
Very truly yours,

Phil Szego

Phil Szego
Customer Service

PS/lt

PACKAGE: 40 LEAD DUAL IN LINE



TERMINALS

P/N	FUNCTION	P/N	FUNCTION	
1.	V_{CC}	21.	Y10	
2.	Frequency Control B	22.	Y9	
3.	Frequency Control C	23.	Y8	
4.	Shift Input	24.	Y7	
5.	Control Input	25.	Y6	Keyboard Matrix Outputs
6.	Parity Invert Input	26.	Y5	
7.	Parity Output	27.	Y4	
8.	Data Output B8	28.	Y3	
9.	Data Output B7	29.	Y2	
10.	Data Output B6	30.	Y1	
11.	Data Output B5	31.	Y0	
12.	Data Output B4	32.	X7	
13.	Data Output B3	33.	X6	
14.	Data Output B2	34.	X5	Keyboard Matrix Inputs
15.	Data Output B1	35.	X4	
16.	Strobe Output	36.	X3	
17.	V_{GI}	37.	X2	
18.	V_{GG}	38.	X1	
19.	Strobe Control Input	39.	X0	
20.	Data & Strobe Invert Input	40.	Frequency Control A	

MAXIMUM RATINGS

V_{GI} and V_{GG} (with respect to V_{CC}) .... −20V to +0.3V
Logic input voltages (with respect to V_{CC}) .... −20V to +0.3V
Storage Temperature .... −65°C to +150°C
Operating Temperature Range .... 0°C to +70°C

ELECTRICAL CHARACTERISTICS

Standard Conditions (unless otherwise noted)
V_{CC} = +5 Volts ± 0.5 Volts,
V_{GG} = −12 Volts ± 1.0 Volts, V_{GI} = GND.
(V_{CC} = Substrate Voltage)
T_A = 0°C to +70°C

GIANT™ GENERAL INSTRUMENT ADVANCED NITRIDE TECHNOLOGY

MTNS KEYBOARD ENCODER READ ONLY MEMORY ■ AY-5-2376

GENERAL DESCRIPTION

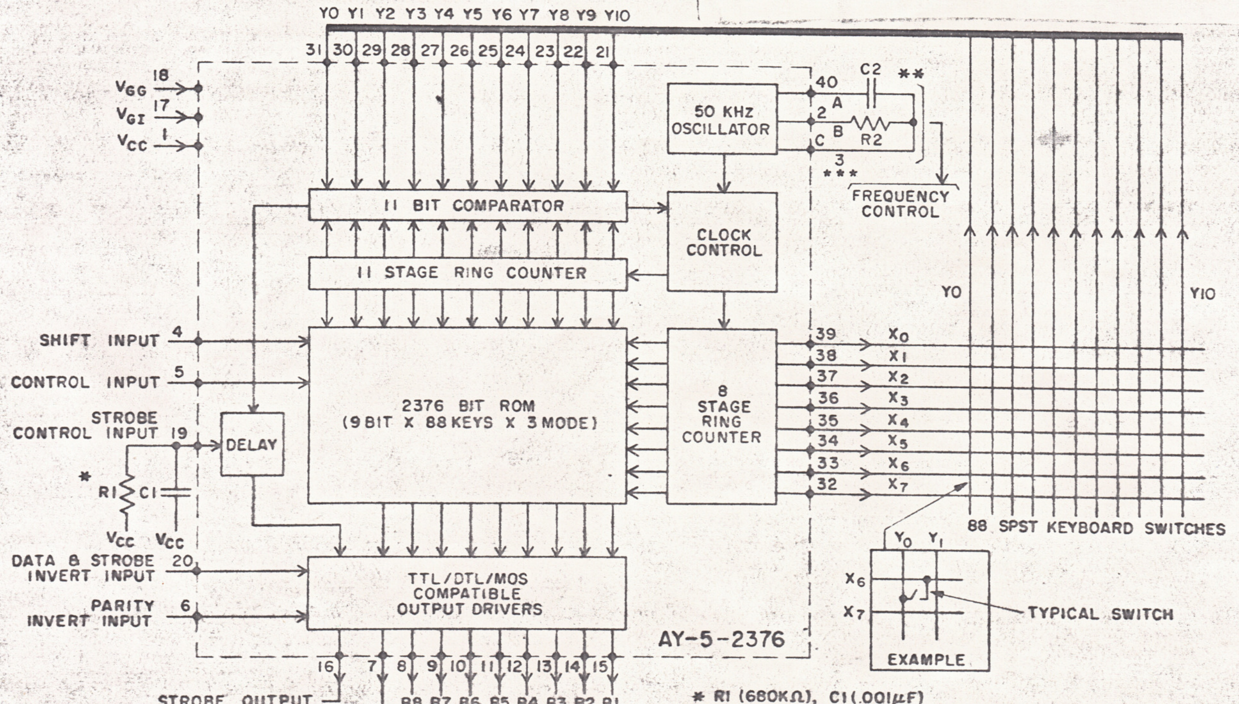
The General Instrument AY-5-2376 is a 2376 Bit Read Only Memory with all the logic necessary to encode single pole single throw keyboard closures into a usable 9-bit code. Data and strobe outputs are directly compatible with TTL/DTL or MOS logic arrays without the use of any special interface components.

The AY-5-2376 is fabricated with MTNS technology and contains 2942 P-channel enhancement mode transistors on a single monolithic chip, available in a 40 lead dual-in-line package.

FEATURES

- Outputs directly compatible with TTL/DTL or MOS logic arrays.
- External control provided for output polarity selection.
- External control provided for selection of odd or even parity.
- Two key roll-over operation.
- N-key lockout.
- Programmable coding with a single mask change.
- Self-contained oscillator circuit.
- Externally controlled delay network provided to eliminate the effect of contact bounce.
- One integrated circuit required for complete keyboard assembly.
- Static charge protection on all input and output terminals.
- Entire circuit protected by a layer of glass passivation.

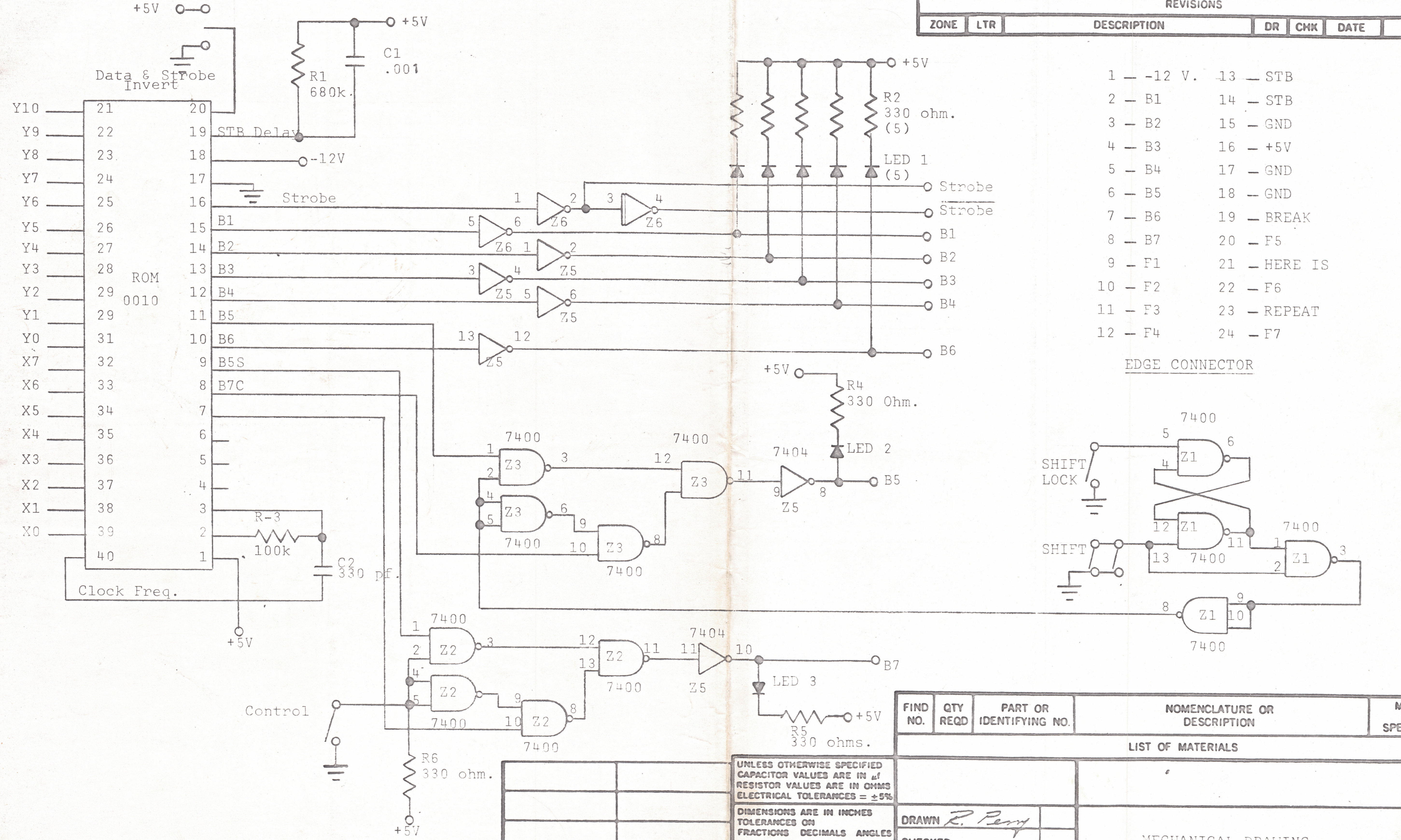
[redacted] TYPICAL CONNECTION OF AY-5-2376



* R1 (680KΩ), C1 (.001μF) PROVIDE APPROX. 1.5mS DELAY (SEE FIG.6)
** R2 (100K), C2 (50pF) PROVIDE 50KHZ CLOCK FREQUENCY (SEE FIG.7)
*** EXTERNAL CLOCK INPUT (OPTION)

ZONE	LTR	DESCRIPTION	DR	CHK	DATE	APPROVED

REVISIONS



FIND NO.	QTY REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR SPECIFICATION

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED CAPACITOR VALUES ARE IN µf RESISTOR VALUES ARE IN OHMS ELECTRICAL TOLERANCES = ±5%

DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS ± — DECIMALS ± — ANGLES ± —

DO NOT SCALE THIS DRAWING

MATERIAL —

FINISH —

NEXT ASSY | USED ON

APPLICATION

DRAWN R. Perry

CHECKED

APPROVED

APPROVED DATE

WEIGHT

MECHANICAL DRAWING

SIZE B | CODE IDENT NO. | DRAWING NO. | REV.

SCALE — | SHEET —

LOCATION	NORMAL	SHIFT	CONTROL	SHIFT/ CONTROL
ESC	ESC	ESC	[	[
1	1	!	q	a
2	2	"	r	b
3	3	#	s	c
4	4	$	t	d
5	5	%	u	e
6	6	&	v	f
7	7	'	w	g
8	8	(	x	h
9	9	)	y	i
Ø	Ø	Ø	p	p
:	:	*	z	j
–	–	=	m	}
BACK SP.	BACK SP	BACK SP.	H	H
TAB	HT	HT	I	I
Q	Q	Q	Q	Q
W	W	W	W	W
E	E	E	E	E
R	R	R	R	R
T	T	T	T	T
Y	Y	Y	Y	Y
U	U	U	U	U
I	I	I	I	I
O	O	_	_	_
P	P	@	@	@
LF	LF	LF	J	J
DEL	DEL	DEL	?	?
A	A	A	A	A
S	S	S	S	S
D	D	D	D	D
F	F	F	F	F
G	G	G	G	G
H	H	H	H	H
J	J	J	J	J
K	K	[	K	[
L	L	\	L	\
;	;	+	{	k
CLR	FS	FF	\	L

LOCATION	NORMAL	SHIFT	CONTROL	SHIFT/ CONTROL
Z	Z	Z	Z	Z
X	X	X	X	X
C	C	C	C	C
V	V	V	V	V
B	B	B	B	B
N	N	↑	N	↑
M	M	]	M	]
,	,	<	l	;
.	.	>	n	~
/	/	?	o	DEL
SP. BAR	SP. BAR	SP. BAR	`	`

ASSEMBLY

1. CHECK PINS ON BOTTOM OF KEYBOARD FOR STRAIGHTNESS. MOUNT ON KEYBOARD. CHECK ALL PINS ARE THRU. P.C. BD.
2. SOLDER KEY ASSEMBLY.
3. INSTALL I.C. & ROM SOCKETS. PIN 1 IS DOT ON P.C. BD.
4. INSTALL R'S, C'S & LEDS AS PER ASSY.
5. SELECT POS OR NEG JUMPER.
6. SOLDER P.C. BD
7. CLEAN BD.
8. INSERT I.C.'S & ROM.

TEST PROCEDURE

1. APPLY POWER TO BD.
2. LED'S SHOULD LIGHT, PRESS ENCODED KEY, LED DISPLAY WILL SHOW ASCII CODE.
3. PRESS #1 KEY & ALTERNATELY PRESS SHIFT & SHIFT LOCK & BIT 5 SHOULD BLINK AS THIS IS DONE.
4. PRESS KEY THAT HAS CODE CHANGE IN CONTROL MODE AS PER CHART AT LEFT, PRESS CONTROL KEY, BIT 7 SHOULD INVERT.
5. CONNECT 1K RESISTOR TO EACH FUNCTION LINE AND OPPSITE END TO +5V. AS EACH FUNCTION KEY IS DEPRESSED THE LEVEL SHOULD GO FROM HIGH TO LOW.
6. PRESS EACH KEY FOR CORRECT CODE OR FUNCTION OUTPUT
7. IF PROBLEM RETRACE ASSY. & TEST PROC.

NORMAL

	B1	B2	B3	B4	B5	B6	B7	B8	B9
X6 Y0	0	0	0	1	0	0	0	0	0
X6 Y1	1	0	0	1	0	0	0	0	0
X6 Y2	0	0	1	0	1	1	0	1	0
X6 Y3	1	0	1	0	1	1	0	1	0
X6 Y4	0	1	1	0	1	1	0	1	0
X6 Y5	1	1	0	1	0	0	0	0	0
X6 Y6	0	0	1	1	0	0	0	0	0
X6 Y7	1	1	1	0	1	1	0	1	0
X6 Y8	0	0	0	1	1	1	0	1	0
X6 Y9	1	0	0	1	1	1	0	1	0
X6 Y10	1	1	1	1	0	0	0	0	0
X7 Y0	0	1	0	1	1	1	1	0	0
X7 Y1	0	0	0	0	1	1	0	1	0
X7 Y2	1	0	0	1	1	1	0	0	0
X7 Y3	0	0	0	1	1	1	0	0	0
X7 Y4	1	1	1	0	1	1	0	0	0
X7 Y5	0	1	1	0	1	1	0	0	0
X7 Y6	1	0	1	0	1	1	0	0	0
X7 Y7	0	0	1	0	1	1	0	0	0
X7 Y8	1	1	0	0	1	1	0	0	0
X7 Y9	0	1	0	0	1	1	0	0	0
X7 Y10	1	0	0	0	1	1	0	0	0

ROM 10 NORMAL

	B1	B2	B3	B4	B5	B6	B7	B8	B9
X0 Y0	0	0	0	0	1	0	0	1	0
X0 Y1	1	0	0	1	1	0	0	1	0
X0 Y2	0	1	0	1	1	0	0	1	0
X0 Y3	1	0	1	1	1	0	0	1	0
X0 Y4	0	0	1	0	0	0	0	0	0
X0 Y5	0	1	1	0	1	0	0	0	0
X0 Y6	1	1	1	1	1	0	0	0	0
X0 Y7	0	1	1	1	1	0	0	0	0
X0 Y8	1	1	0	1	1	0	0	0	0
X0 Y9	0	0	1	1	1	0	0	0	0
X0 Y10	1	0	1	1	1	1	1	1	1
X1 Y0	0	0	0	0	0	1	0	0	0
X1 Y1	1	1	1	1	0	1	0	1	0
X1 Y2	0	1	1	1	0	1	0	1	0
X1 Y3	0	0	1	1	0	1	0	1	0
X1 Y4	1	0	1	1	0	0	1	1	0
X1 Y5	0	1	1	1	0	0	1	1	0
X1 Y6	0	1	0	0	0	0	1	0	0
X1 Y7	0	1	1	0	1	0	1	1	0
X1 Y8	1	1	0	0	0	0	1	0	0
X1 Y9	0	0	0	1	1	0	1	1	0
X1 Y10	0	1	0	1	1	0	1	1	0
X2 Y0	1	0	1	1	0	0	0	0	0
X2 Y1	1	0	0	0	1	0	0	1	0
X2 Y2	0	0	1	1	0	1	0	0	0
X2 Y3	0	0	0	0	1	1	0	1	0
X2 Y4	0	1	1	1	0	1	0	0	0
X2 Y5	0	1	0	0	1	0	0	1	0
X2 Y6	1	0	1	1	0	1	0	1	0
X2 Y7	0	0	0	1	1	0	0	0	0
X2 Y8	1	1	0	0	1	0	0	1	0
X2 Y9	0	0	1	0	1	0	0	1	0
X2 Y10	1	1	0	1	1	0	0	1	0

NORMAL

	B1	B2	B3	B4	B5	B6	B7	B8	B9
X3 Y0	1	1	1	1	1	1	1	1	1
X3 Y1	1	1	0	1	1	1	0	0	0
X3 Y2	0	0	1	1	0	0	1	1	0
X3 Y3	1	1	0	1	0	0	1	1	0
X3 Y4	0	1	1	1	0	0	1	0	0
X3 Y5	0	0	0	1	0	0	1	0	0
X3 Y6	1	1	1	0	0	0	1	0	0
X3 Y7	0	1	1	0	0	0	1	0	0
X3 Y8	0	0	1	0	0	0	1	0	0
X3 Y9	1	1	0	0	1	0	1	1	0
X3 Y10	1	0	0	0	0	0	1	0	0
X4 Y0	0	0	0	0	0	0	0	0	0
X4 Y1	1	0	0	0	0	0	0	0	0
X4 Y2	1	0	0	0	1	1	0	1	0
X4 Y3	0	1	0	0	1	1	0	1	0
X4 Y4	1	1	0	0	1	1	0	1	0
X4 Y5	0	1	0	0	0	0	0	0	0
X4 Y6	1	1	0	0	0	0	0	0	0
X4 Y7	0	0	1	0	0	0	0	0	0
X4 Y8	1	0	1	0	0	0	0	0	0
X4 Y9	0	1	1	0	0	0	0	0	0
X4 Y10	0	1	1	1	0	0	0	0	0
X5 Y0	0	1	0	1	0	0	0	0	0
X5 Y1	0	0	0	0	1	0	1	0	0
X5 Y2	1	1	1	1	0	0	1	1	0
X5 Y3	1	0	0	1	0	0	1	0	0
X5 Y4	1	0	1	0	1	0	1	1	0
X5 Y5	1	0	0	1	1	0	1	1	0
X5 Y6	0	0	1	0	1	0	1	1	0
X5 Y7	0	1	0	0	1	0	1	1	0
X5 Y8	1	0	1	0	0	0	1	0	0
X5 Y9	1	1	1	0	1	0	1	1	0
X5 Y10	1	0	0	0	1	0	1	1	0

PARTS LIST

FOR KEYBOARD ENCODER

CAT. #92CU3208, 92CU3209

QTY	DESCRIPTION	PART NO.
1	P. C. BOARD	92CU3133
1	62-KEY KEYBOARD	92CU3099
2	20-PIN MOLEX STRIP FOR ROM	92CU1609
1	Z4, ROM 0010	92CU2321
5	14-PIN I.C. SOCKETS	92CU1308
3	Z1, Z2, Z3, (SN7400)	92CU1981
2	Z5, Z6 (SN7404)	92CU1981
8	R2, R4, R5, R6 (330 OHM, ¼W, 10%)	-
1	R1 (680K, ¼W, 10%)	-
1	C1 (.001 DISC)	-
1	JUMPER WIRE * (BETWEEN P AND N)	-
1	C2 (330 pf Disc)	-
1	R3 (100K, ¼W, 10%)	-
7	LED 1, 2, 3 (MICRO RED)	92CU2137
1	DRAWING, KEY LAYOUT	-
1	DRAWING, ASSY INSTRUCTIONS & TEST PROCEDURE	
1	DRAWING, SCHEMATIC (MECH. DWG.)	
1	DRAWING, ASSY LAYOUT	

* USE WIRE CUT FROM C1 or C2 FOR JUMPER.

ADDENDUM TO
GUIDE FOR THE CONSTRUCTION OF
KEYBOARD AND ENCODER KIT

1. Please note that there are different ASCII codes. The ASCII code being used with our Keyboard Kit is the 7-bit ASCII as advertised. Please study our ads in the enclosed kit if it is an ASCII that you are not interested in.

2. There is no ASCII code for the following keys:

   CONTROL, SHIFT LOCK, BREAK, HERE IS, REPEAT, SHIFT, OR ANY OTHERS WITH THE SMALL LETTER "F" IN THE LOWER RIGHT-HAND SIDE.

3. All keys LETTERS F1 THROUGH F7 are non-coded keys. It will be up to the individuals design for the proper use or function.

4. With proper interfacing, this keyboard may be used with TV, RTTY, Altair, etc.

FURTHER HELPFUL NOTES IN CONSTRUCTION:

1. Please make sure that you understand all the parts that are to be inserted into their respective places.

2. In the insertion of parts, make sure you follow the diagrams 100%. For example, if the ICs are inserted in the wrong direction, you may blow them and then finally end up returning the ICs and blaming it on to us. Please take extra care in the insertion of the integrated circuits. Handle them, expecially the ROM, with ultimate care so that you may have a product that you will be entirely satisfied with.

3. All our components have been 100% - repeat, 100% in circuit keyboard test, so that you are receiving 100% material. We are assuming that any customer who buys this keyboard is a master in soldering. One of the most common errors in construction is that people who feel they are experts may not be, and excess solder may flow down into the holes and cause shorts.

4. LEDS - unnecessary excessive soldering or heat can blow the LEDS or make them dim, which could effect the keyboard's workable efficiency.

5. A scope would be useful in the construction of this keyboard. You will find a trouble-shooting guide enclosed. Please use it.

We do hope that you are entirely satisfied with the product. If not, please write to the undersigned and advise of your problems on the item. We will be very happy to guide you or discuss it with you.

Norman Silverman
General Manager